N 536 - Utilization of Nursing Research in Advanced Practice, Summer 2008

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Research Design

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Design Characteristics

- Maximizes control over factors to increase the validity of the findings
- Guides the researcher in planning and implementing a study
Level of Control: Quantitative Research

- Descriptive
- Correlational
- Quasi-experimental
- Experimental

Increased Control with Design
Concepts Relevant to Research Design (1)

Causality

A \rightarrow B
Pressure \rightarrow Ulcer

Multicausality

Years smoking \rightarrow Heart disease
High fat diet \rightarrow Heart disease
Limited exercise \rightarrow Heart disease
• Probability: Likelihood of an outcome
• Bias: Slanting findings
• Manipulation: Treatment
• Control: All phases of design
Design Validity

- Measure of accuracy of a study
- Examined with critique of the following dimensions:
  - Statistical conclusion validity
  - Internal validity
  - Construct validity
  - External validity
Elements of a Strong Research Design (1)

- Controlling the environment of the study setting

- Levels of controlling:
  - Natural setting
  - Partially controlled setting: e.g., clinics
  - Highly controlled setting: e.g., laboratory
Elements of a Strong Research Design (2)

- Controlling the equivalence of subjects and groups
  - Random subject selection
  - Random assignment to groups
Elements of a Strong Research Design (3)

- Controlling the treatment
  - Choose a treatment based on research and practice
  - Develop a protocol for implementation
  - Document the implemented treatment
  - Use a check-list to determine the extent of completeness to which the treatment was implemented
  - Evaluate the treatment during the study
Elements of a Strong Research Design (4)

- Controlling measurement
  - Reliability
  - Validity
  - Number of measurement methods
  - Types of instruments
Elements of a Strong Research Design (5)

- Controlling extraneous variables
  - Identify and eliminate extraneous variables via sample criteria, choice of settings, or research design
  - Random sampling
  - Sample: Heterogenous, homogeneous, or matching
  - Statistical control
Problems with Study Designs

- Inappropriate for the study purpose or the research framework
- Poorly developed designs
- The research methods were poorly implemented
- Inadequate treatment, sample, or measurement methods
Selecting a Design

Is there a treatment?

- No
- Yes

Is the primary purpose examination of relationships?

- No
- Yes

Is the treatment tightly controlled by the researcher?

- No
- Yes

Descriptive Design

Will the sample be studied as a single group?

- No
- Yes

Quasi-Experimental Study

Will a randomly assigned control group be used?

- No
- Yes

Correlational Design

Is the original sample randomly selected?

- No
- Yes

Experimental Study
Selecting a Descriptive Design

Examining sequences across time?

No  
One Group?

No
Comparative Design

Yes
Descriptive Design

Yes
Following same subjects across time?

No
Data collected across time

No
Cross-sectional design

Yes
Studying events partitioned across time?

No
Trend Analysis

Yes
Repeated measures of each subject

Yes

No

Yes

Single unit of study

No
Longitudinal Study

Yes
Case Study

Research Design

Cross-sectional design with treatment partitioning

Longitudinal design with treatment partitioning
A Typical Descriptive Design

Clarification → Measurement → Description → Interpretation

Phenomenon of Interest

- Variable 1
- Variable 2
- Variable 3
- Variable 4

Description of Variable 1
Description of Variable 2
Description of Variable 3
Description of Variable 4

Interpretation of Meaning
Development of Hypotheses
A Comparative Descriptive Design

Group I
{variables measured}

Group II
{variables measured}

Describe → Comparison of Groups on Selected Variables → Interpretation of Meaning

Describe → Development of Hypotheses
## Selecting the Type of Correlational Design

<table>
<thead>
<tr>
<th>Describe relationships between/among variables?</th>
<th>Predict relationships between/among variables?</th>
<th>Test theoretically proposed Relationships?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptive correlational design</td>
<td>Predictive correlational design</td>
<td>Model testing design</td>
</tr>
</tbody>
</table>
A Descriptive Correlational Design

Measurement

- Research Variable 1
- Research Variable 2

Description of variable

Examination of Relationship

Interpretation of Meaning

Development of Hypotheses
A Predictive Design

\[
\text{Value of Intercept} + \text{Value of Independent Variable 1} + \text{Value of Independent Variable 2} = \text{Predicted Value of Dependent Variable}
\]
Selecting The Type of Quasi-Experimental Design

- Control Group?
  - No
  - Pretest?
    - No
    - One-group post-test only design
    - Comparison with population values?
  - Yes
    - Repeated Measures?
      - No
      - Strategy for Comparison
        - No
        - Suggest Reevaluating design
        - One group pretest/post-test design
      - Yes
        - Compare treatment & control conditions?
    - Yes
      - Repeated Measures?
Selecting The Type of Experimental Design

- Pretest
  - No
    - Post-test only control group design
  - Yes
    - Repeated Measurements?
      - No
        - Examine effects of confounding variables?
          - No
            - Multiple sites?
              - Pretest/post-test control group design
          - Yes
            - Blocking?
              - No
                - Randomized clinical trials
              - Yes
                - Randomized Block Design
      - Yes
        - Repeated measures design
          - No
            - Comparison of multiple levels of treatment
              - No
                - Examination of complex relationships among variables in relation to treatment
              - Yes
                - Nested Designs
Pretest-Post Test, Control Group Designs

<table>
<thead>
<tr>
<th>Randomly selected experimental group</th>
<th>PRETEST</th>
<th>TREATMENT</th>
<th>POST-TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly selected control group</td>
<td>PRETEST</td>
<td>POST-TEST</td>
<td></td>
</tr>
</tbody>
</table>

**Treatment:** Under control of researcher

**Findings:**
- Comparison of pretest and post-test scores
- Comparison of experimental and control groups
- Comparison of pretest-post-test differences between samples

**Example:** Your self (1990). The impact of group reminiscence counseling on a depressed elderly population.

**Uncontrolled threats to validity:**
- Testing
- Mortality

**Instrumentation**
- Restricted generalizability as control increases
# Post-Test-Only Control Group Design

<table>
<thead>
<tr>
<th>Randomly selected experimental group</th>
<th>Randomly selected control group</th>
<th>TREATMENT</th>
<th>POST-TEST</th>
<th>POST-TEST</th>
</tr>
</thead>
</table>

- **Treatment:** Under control of researcher
- **Findings:** Comparison of experimental and control groups
- **Uncontrolled threats to validity:** Instrumentation, Mortality, Limited generalizability as control increases
### Pain Control Management

<table>
<thead>
<tr>
<th>Traditional care</th>
<th>PRN Medication</th>
<th>New approach: “Around the clock” medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit A</td>
<td>Unit B</td>
<td>Unit E</td>
</tr>
<tr>
<td>Unit B</td>
<td>Unit C</td>
<td>Unit F</td>
</tr>
<tr>
<td>Unit C</td>
<td>Unit D</td>
<td>Unit G</td>
</tr>
<tr>
<td>Unit D</td>
<td>Unit E</td>
<td>Unit H</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Primary Nursing Care</th>
</tr>
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<td>Primary Care</td>
</tr>
</tbody>
</table>

- Unit A
- Unit B
- Unit C
- Unit D
- Unit E
- Unit F
- Unit G
- Unit H

#### Research Design
Advantages of Experimental Designs

- More controls in design and conducting a study
- Increased internally validity
  - Decreased threats to design validity
- Fewer rival hypotheses
Advantages of Quasi-Experimental Designs

- More practical
  - Ease of implementation
- More feasible
  - Resources, subjects, time, setting
- More generalizable
  - Comparable to practice
Developing the Design Section of Your Proposal

- Identify the design
  - Name it specifically
- Provide a map of the design
- Discuss your rationale for using this design
- Describe threats to the validity of the chosen design